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The Information Systems Magazine for Management

Part 1

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Micrographics Survey: Playing the Trump Card

White-Collar Productivity: Top Management Doesn't Know What It Wants

Buying Magnetic Media: Go for Quality

Manufacturing Systems: Tolerating Change

Bottom-Line Report: COM's New Role: Out of the Darkroom

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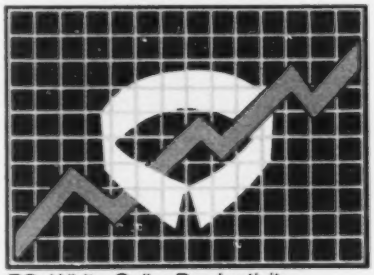

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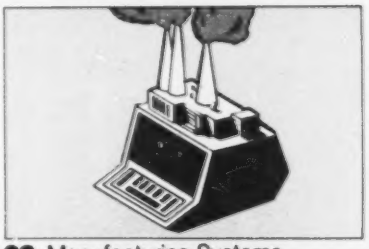

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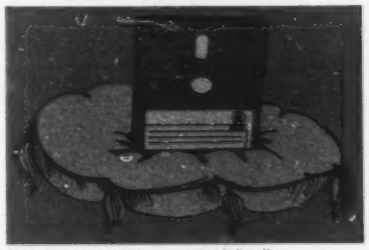

80 Buying Magnetic Media

Coming in May

Strategic planning can keep Information Systems (IS) Managers on course and not adrift in the heavy seas of management responsibilities. Keeping the ship on course requires management steering and strategic planning. Also, in May are graphics software, a preview of the National Computer Conference (NCC) and small systems and distributed DP in the Bottom-Line Report.

ABP

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BPA

Micrographics Usage Survey:

PLAYING THE TRUMP CARD

INFOSYSTEMS' 12th annual usage survey shows a real surge of interest in computer-output microfilm (COM) and computer-assisted retrieval systems. The increasing control of micrographics by the MIS/DP operation was confirmed. There's no doubt that the micrographics trump card is being played, and it's being done mostly by MIS/ DP people.

By John M. Lusa
Editor

For whatever reasons, there is a real surge in the use of computer-output microfilm (COM) recorders this past year. It appears COM is being used by the MIS/DP operation to get more efficiency in the use, handling and storage of data. Over the years the micrographics or records managers have vainly been trying to sell micrographics as an answer to the paper problem.

On the surface, the savings in paper costs seemed like a good story, but it wasn't making any real headway. Not until the computer came into the micrographics picture and brought high-speed automation with it did it make any sense to depend on data that was hidden on a small piece of film. Now, not only can data be placed on film at high speed, but it can be retrieved at high speed. The loop has been closed and the computer has made this possible.

So the micrographics trump card is being played with the help of the computer. It may be difficult to determine whether MIS/DP people discovered micrographics or whether micrographics discovered the computer. It probably doesn't make much difference which came first, because the marriage has been made between computers and micrographics and it bodes fell for both users and vendors.

In the 12th annual usage survey conducted by INFOSYSTEMS users were asked if they use COM in-house. Some 20.9 percent said yes. That's just about double over last year's response when 10.9 percent answered in the affirmative. As part of that question, another 36.3 percent said they used COM through a service bureau. That's down from 40.5 percent a year ago. This indicates a definite move away from service bureaus. But there was no doubt that COM usage is up, because another 12.7 percent said they plan to use it within two years, up from 8.4 percent. This year only 30.1 percent said they don't use COM at all. In 1981, 40.2 percent said no. Overall, COM

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How Micrographics Needs Are Handled

	(Percentage)
All Handled By A Service Organization	30.5
All In-House	29.6
Most In-House	19.6
Equal Split Between In-House And By A Service Organization	10.2
Most At A Service Organization	10.2

Future Plans
Micrographics In-House Vs. Service Organization

	(Percentage)
Larger Share In-House	13.4
Larger Share From Service Organization	5.3
Little Or No Change	81.3

COM Usage

	(Percentage)
Yes, In-House	20.9
Yes, Service Bureau	36.3
Plan To Within 2 Years	12.7
No	30.1

How Micrographics Is Used

	(Percentage)
Active or daily reference	83.9
Semiactive reference	79.5
Archival	84.1

*Totals to more than 100.0 percent due to multiple responses.

Who Recommends The Equipment?

	(Percentage)
DP Department	32.6
User Group	17.0
Office Services Staff	11.2
MIS	18.4
Records Manager	16.8
Other	13.5
Systems Group	11.2
Micrographics	12.4
Service Bureau	3.0
Purchasing Department	9.1
Consultant	3.5

*Totals to more than 100.0 percent due to multiple responses.

Who Is In Charge?

	(Percentage)
1 DP Department	39.7
2 User Group	21.4
6 Office Services Staff	10.8
3 MIS	16.3
4 Records Manager	16.0
5 Other	14.9
7 Micrographics Department	10.4
8 Systems Group	5.0

*Totals to more than 100.0 percent due to multiple responses.

Who Designs The System(s)?

	(Percentage)
DP Department	32.8
User Group	19.8
MIS	20.5
Office Services Staff	10.5
Systems Group	18.9
Vendor	10.9
Records Manager	16.8
Micrographics Department	12.3
Other	11.4
Engineering	5.7
Consultant	4.1
Service Bureau	8.9

*Totals to more than 100.0 percent due to multiple responses.

Who Approves Expenditures?

	(Percentage)
Financial Management	27.4
President/VP/GM	36.6
DP Management	20.0
User Department	24.1
Other	10.8
Micrographics Department	6.2

*Totals to more than 100.0 percent due to multiple responses.

Average Dollars Spent For Micrographics Per User Firm

Product	1977	1978	1979	1980	1981	1982*
Film	$ 7,140	$15,985	$19,541	$12,959	$15,877	$22,178
Equipment	5,913	23,202	25,652	18,301	35,346	37,877
Supplies	1,479	6,644	10,749	8,503	14,514	8,986
Services	10,467	16,465	19,748	15,351	17,281	19,600
Avg. Total	$24,999	$37,646	$46,436	$39,170	$74,200	$85,573
Salaries	**	**	**	$40,830	$62,812	$76,565

*estimated **not available

Usage Survey

. . . continued

usage is up six percent.

The use of computer-assisted retrieval (CAR) systems is also up. This year some 12.3 percent said they use CAR as compared to 7.0 percent last year. Usage has practically doubled. Planned usage continues strong as 5.9 percent said they plan to use within a year, while another 30.3 percent said they plan to use within five years. These figures for planned CAR usage are just slightly ahead of last year.

The trend toward control of the micrographics function by the MIS/DP departments continues in this year's survey. A combined total of 51.0 percent of the respondents said MIS/DP recommends micrographics equipment. This is up from a combined total of 47.1 percent in 1981. Interestingly, records managers gained ground in 1982. In 16.8 percent of the cases they do the recommending. This compares to 12.6 percent in 1981.

The strength of the MIS/DP departments shows up even stronger in the response to the question: "Who is in charge?" The combined total here is 56 percent. User groups show a little influence in this category with 21.4 percent of the respondents.

The MIS/DP departments received the majority of the replies in response to "Who designs the systems?" The combined total here is 53.3 percent. Obviously, the systems group shows up with a higher percentage—18.9 while user groups is 19.8 and records managers is 16.9.

Average dollars spent for micrographics per user firm shows a dramatic increase over the past two years. The total in the 1982 survey for all types of estimated 1982 expenditures is $85,573. This is a 15 percent increase over

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Percentage Of Usage Of Micrographics By Industry

	Storage	Active Or Daily Reference	Semi-Active Reference
Construction, Mining And Agriculture	58.5	27.5	14.0
Manufacturing	34.8	41.2	24.0
Transportation	26.6	51.7	21.7
Utilities/ Communications	35.9	44.9	19.2
Retail/ Wholesale	22.2	54.6	23.2
Banking/ Financial	38.1	44.8	17.1
Insurance	27.1	47.9	25.0
Service Organizations	47.3	28.6	24.1
DP Service Organizations	23.8	41.7	34.5
Consultants	25.0	34.6	40.4
Educational	31.5	41.2	27.3
Government/Military	42.6	33.5	23.9
Total	34.9	40.9	24.2

Types Of Outside Micrographics Services Used

(Percentage)

Mag-Tape-To-Film Conversion (COM)	61.1
Filming Documents	41.0
Processing Film	29.3
Duplicating Film	24.4
Film-To-Paper Conversion	5.7
Storage	7.1
Mag-Tape-To-Paper Conversion	4.6

*Totals to more than 100.0 percent due to multiple responses.

Use Of Computer-Assisted Retrieval (CAR) Systems

(Percentage)

Presently Use	12.3
Plan To Use Within The Year	5.9
May Use In 2-5 Years	30.3
No Plan To Use	45.3
No Knowledge Of CAR	6.2

Type Of Computer-Assisted Retrieval (CAR) Used

(Percentage)

Mainframe Controlled System	41.2
Stand-Alone Retrieval Unit	35.3
Others	17.6
Both	5.9

Usage Survey

. . . continued

the actual expenditure for 1981. Expenditures for salaries increased 22 percent from $62,817 to $76,565.

The active or daily use of micrographics shows a healthy increase from 75 percent in 1981 to 83.9 percent. This probably is a reflection of the growing use of COM and CAR. Semiactive reference is about the same—79.5 percent in 1982 as compared to 80 percent in 1981. Archival use jumped just two percent to 84.1 percent.

It appears users are placing more emphasis on in-house production of film. The answers to this question are possibly related to increased COM usage. As a percentage of the total, service bureau usage dropped from 34.7 percent in 1981 to 30.5 percent in 1982. At the same time, "all in-house" production increased from 21 percent to 29.6 percent, while "most at a service organization" dropped to 10.2 percent from 14.6 percent. These percentages don't necessarily mean a drop in revenues for service bureaus as reflected in the response to total expenditures mentioned earlier.

On the other hand, when the respondents replied to future plans, 13.4 percent plan to do more work in-house. This is down slightly from 14.8 percent in 1981. Their responses to "larger share from service organizations" was pegged to 5.3 percent. This is down from 9.4 percent in 1981.

In analyzing the usage of micrographics by industry, the 1982 figures show an increase across all categories. As would be expected, sites that represent banking/financial, government, insurance and utilities indicate the greatest usage. They answered in the affirmative in the majority of the cases. Banking/financial is tops with 63.4 percent.

The marriage of micrographics to other technologies is generally on the upgrade. For instance, microfacsimile usage jumped from 12.3 percent in 1981 to 14.7 percent this year; computer-assisted graphics on microfilm from 8.1 percent to 11.6 percent, and the merging of text and graphics on microfilm from 3.9 percent to 7.0 percent.

There were many comments from users that, for the most part, indicated a growing interest in micrographics. One respondent said, "I would like to sell my senior management on the use of graphics and micrographics to replace or enhance our word processing and our data processing reports."

Another respondent pointed out that the applications of micrographics "must be tempered with reasonable planning regarding good records management and disposal." He said, "There seems little reason to save everything except in clear areas of historical value to the company or government."

As a warning, he added, "There is one danger of adopting technologies capable of 'saving everything at the reasonable cost.' One still has to manage the 'everything,' which becomes a monumental problem virtually requiring a computer."

The 1982 survey was based on replies from 1,700 organizations. □

Usage Of Micrographics By Industry

Industry		(Percentage) Yes	No
1	Banking/Financial	63.4	36.6
3	Government/Military	51.4	48.6
3	Insurance	51.4	48.6
2	Utilities/Communications	58.1	41.9
9	Service Organizations	23.7	76.3
5	Educational	28.0	72.0
7	Manufacturing	24.5	75.5
6	Transportation	25.9	74.1
10	Retail/Wholesale	19.6	80.4
12	DP Service Organizations	12.7	87.3
11	Consultants	17.3	82.7
8	Construction, Mining And Agriculture	24.4	75.6
	All Other	40.0	60.0

Growing Uses For Micrographics

	Today	Two Years From Now
	Percent Total	Percent Total
Filming Correspondence	28.4	19.1
Microfacsimile	14.7	3.5
Computer-Assisted Graphics On Micro	11.6	10.1
Computer Input Micro (CIM)	9.7	7.3
Word Processors Outputting To COM	4.2	19.1
Merging Text And Graphics On Micro	7.0	8.4
Electronic Mail Outputting To COM	2.6	8.8

Complete Report Available

Complete spiral-bound copies of the backup summary of the survey are available for $50. This shows a detailed breakdown, by industry, for each of the 18 questions asked on the survey.
Check or company purchase order must accompany all orders. Mail request to: Infosystems Micrographics Survey, Research Department, Hitchcock Publishing Co., Hitchcock Building, Wheaton, IL 60187.

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Micrographic Salaries

Increases Based on National Norm

Operations Manager Makes $827 for a Week's Work

Full-time micrographic operational personnel across all categories were given increases that corresponded to national norms established by other industries. Interestingly, the fifth annual salary survey conducted by INFOSYSTEMS indicates a 9.0 percent increase when all nine national average categories are combined.

The results were based on 372 responses from a mailing to 2,970 potential using firms. The respondents were asked to report salaries in effect on March 1, 1982.

The highest increase in a national average was posted for the senior COM operator (category 30). The survey shows a 25.6 percent jump from $265 a week in 1981 to $333 in 1982. This increase is confirmed by also analyzing the change in the median actual salary (half above and half below). This shows an increase of 22.4 percent from $250 to $306 per week.

The next highest increase in average weekly salary was given to duplicating technicians (43) at 16.8 percent. This represents an increase from an average of $197 a week to $230.

The highest individual salary in the survey was indicated for the operations manager (01). It was $827 for a week's work. Last year, the highest salary at $750 was in the same category.

For a copy of the complete job descriptions used in the salary survey, enter No. 4 on the Reader Information Card at the back of this issue. □

Job Descriptions

Operations Manager, Micrographic Center (01). Plans, organizes and oversees all activities of the micrographic center through managing subordinates or by direct supervision.

Production or Laboratory Shift Supervisor (or leader), Micrographic Center (10). Responsible for the micrographic center's production operations on one shift.

COM Operator, Senior (30). Responsible for the complete operation of the COM equipment including job setup.

COM Operator, Junior (31). Operates the COM equipment under general supervision according to predetermined production schedules, quality standards, device capabilities and tape formatting requirements.

Micrographics Laboratory Technician (40). Fully experienced in basic wet process silver film technology.

Micrographics Processing Technician (41). Sets up, controls, adjusts and operates automated micrographic processors and duplicators, either one or both types.

Rotary/Planetary Camera Operator (42). Sets up, loads and operates a rotary or planetary camera for recording source documents on microfilm.

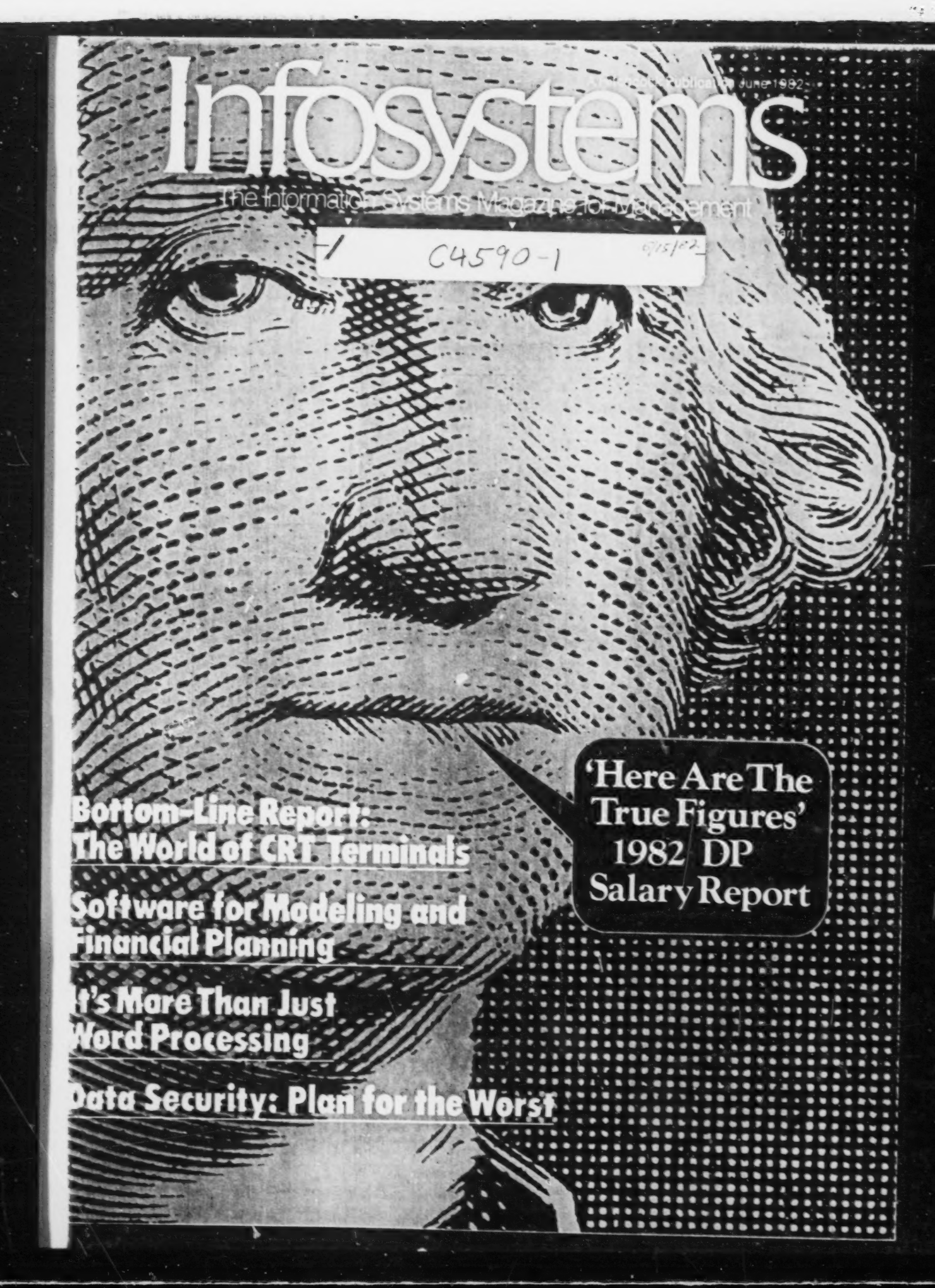
Micrographic Duplicating Technician (43). Operates one or more micrographic duplicators to produce roll-to-roll film, microfiche or aperture cards.

Micrographic Production Clerk (44). Receives, logs in, prepares and distributes documents to be microfilmed.

Weekly Salaries For All Micrographic Jobs: Nationwide

National Statistics	Operations Manager, Micrographics Center (01)	Prodn/Lab Shift Supv. (or Leader) (10)	COM Operator, Senior (30)	COM Operator, Junior (31)	Micrographic Laboratory Technician (40)	Micrographic Processing Technician (41)	Rotary/Planetary Camera Operator (42)	Micrographic Duplicating Technician (43)	Micrographic Production Clerk (44)
Number Reported	27	36	49	33	30	26	78	17	45
Lowest Reported Actual Salary	235	200	173	135	161	144	144	120	115
25th Percentile* Actual Salary	357	231	240	208	173	175	173	172	148
National Average Actual Salary	446	321	333	256	243	244	208	230	177
Median* Actual Salary	462	279	306	265	202	212	194	238	163
Mode† Actual Salary	404	200	404	313	164	193	194	177	148
75th Percentile* Actual Salary	508	370	404	313	280	275	230	274	205
Highest Reported Actual Salary	827	712	654	423	558	500	447	447	297
Established Salary Range Average Low	372	275	261	222	223	208	185	195	173
Established Salary Range Average High	526	412	368	315	306	279	253	262	248

*25th Percentile—That point at which 25 percent of all other salaries are lower and 75 percent are higher.
*Median—A figure having an equal number above and below.
†Mode—The salary reported most often.
*75th Percentile—That point at which 75 percent of all other salaries are lower and 25 percent are higher.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'Here Are The True Figures' 1982 DP Salary Report
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Coming in July
A summer bonanza of software. INFOSYSTEMS' 12th semiannual Software Info Review will be featured, in addition to articles on data entry, general purpose and PCM computers and government data bases.

ABP

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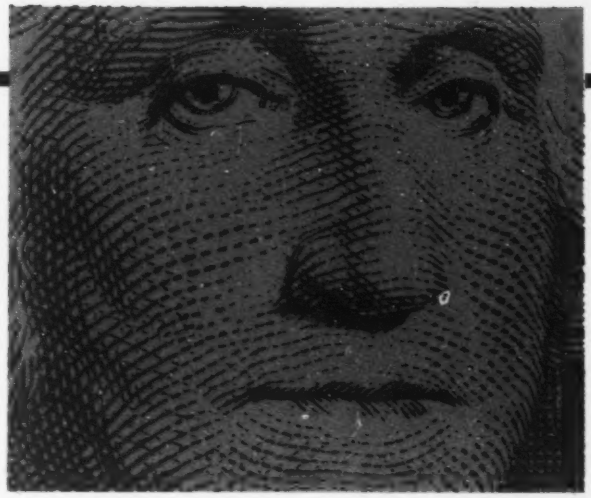
The Real Truth about DP Salaries



It's a different picture from a year ago. The real truth is that salaries aren't taking dramatic jumps as they have in past years. INFOSYSTEMS' 24th annual DP salary survey shows an overall increase of only 4.0 percent. Results are based on 12,992 workers in 1,106 firms.

By John M. Lusa, Editor, and Raymond S. Winkler, Manager of Research

Editor's Note: The editors of INFOSYSTEMS are proud to present the 24th annual salary survey of DP user personnel. It was the industry's first and now has the reputation of providing the most comprehensive results. The survey is completely planned and executed by the magazine's editorial and research departments. Results are computed from a large base of responses and great care is taken to present unbiased results.

A year ago it appeared that an inflation-driven economy and a shortage of skilled DP personnel were responsible for salary increases averaging in the double-digit range. Some of the programmer/analyst categories were in the 20s with one category as high as 22.6 percent.

It's a different picture in 1982. Only four of the 35 categories included in the study show average increases in the double digits. None were in the 20 percent range. In fact, seven categories show a decrease. Interestingly, the decreases are at the lowest levels, such as programmer trainees and juniors. This could indicate the DP/MIS organizations aren't doing much hiring at this level and are able to pay less for those that are hired.

The 1982 survey is based on weekly salaries in effect on March 1, 1982. Some 1,106 firms participated in the study. They reported the salaries of 12,992 individuals. With this large base, salary data can be segregated by industry types and geographical and metropolitan regions. This data is found on the large charts on the following pages.

Along with the salary questions, others were asked that dealt with budgets and titles. This data is shown in the charts adjacent to this article.

The average increase for all worker categories was 4.0 percent. When compared to the 12.8 percent reported in the 1981 study, the lower figure indicates that the recession could have had a deflationary effect on weekly salaries. The category with the highest increase was for data base administrators (02) at 17.4 percent. However, when combined with 1981 percentage of 1.0 percent, this shows a two-year average increase of only 9.0 percent. The next highest category was assistant DP manager (04). It was 14.7 percent. Here again, the two-year average was only about 9.0 percent when the 1981 figure of 2.8 percent is considered.

A new question in this year's survey was asked about unfilled programmer/analyst positions in each DP operation. This question was inspired by "reported" shortages of programmers a year ago. Respondents were asked to compare shortages on March 1 with the previous year. This year, only 18.5 percent of those reporting indicated a shortage that averaged 2.9 individuals per operation. This compares to 22.1 percent a year ago with an average shortage of 3.7 individuals. This indicates some shrinkage in the job market. Even a year ago, only one out of five operations were in any significant hiring posture.

The picture for systems analysts looks even more settled. A year ago, only 14.0 percent of the respondents had openings that averaged 2.5 indi-

Percentage of 1982 Budget For:
(By Equipment Rental Range)

Rental Range Per Month	Outside Services	Software	Hardware (and Maintenance)	Personnel	Supplies	Other
Under $3,000	12.5	9.3	23.4	43.5	8.5	2.8
$3,000 to $4,499	3.5	6.7	26.7	48.9	10.2	4.0
$4,500 to $5,999	5.0	5.5	29.9	47.4	8.6	3.6
$6,000 to $8,999	5.8	6.2	32.9	41.4	8.4	5.3
$9,000 to $11,999	5.3	5.0	33.1	44.1	7.9	4.6
$12,000 to $14,999	10.0	5.3	31.9	41.6	7.2	4.0
$15,000 to $17,999	5.5	6.7	30.2	47.0	7.2	3.4
$18,000 to $24,999	5.8	7.0	34.8	41.8	7.0	3.6
$25,000 to $49,999	5.5	6.9	31.5	43.8	7.8	4.5
$50,000 to $74,999	9.6	5.2	33.7	43.5	5.7	2.3
$75,000 to $99,999	7.0	3.3	35.3	47.1	5.0	2.3
$100,000 to $149,999	17.4	4.9	27.3	41.7	4.7	4.0
$150,000 or more	5.1	7.3	34.5	43.6	5.8	3.7
Not available	33.3	1.0	12.0	46.0	3.3	4.4
Total	7.4	6.7	29.8	44.3	8.0	3.8

1981 Operating Budget vs. DP Budget
(By Equipment Rental Range)

Rental Range Per Month	Average Total Operating Budget (in millions)	Average DP Budget (in millions)	Average Percent
Under $3,000	9.575	.117	1.22
$3,000 to $4,499	14.966	.197	1.32
$4,500 to $5,999	19.023	.308	1.62
$6,000 to $8,999	26.042	.331	1.27
$9,000 to $11,999	28.381	.365	1.29
$12,000 to $14,999	32.403	.499	1.54
$15,000 to $17,999	32.674	.622	1.90
$18,000 to $24,999	38.058	.698	1.83
$25,000 to $49,999	83.062	1.083	1.30
$50,000 to $74,999	125.472	1.373	1.09
$75,000 to $99,999	224.190	4.855	2.17
$100,000 to $149,999	393.448	5.242	1.33
$150,000 or more	431.569	11.021	2.55
No Answer	65.561	.864	1.32
Total	67.102	1.061	1.58

1981 Revenues vs. DP Budget
(By Equipment Rental Range)

Rental Range Per Month	Average Total Revenues (in millions)	Average DP Budget (in millions)	Average Percent
Under $3,000	14.397	.109	.75
$3,000 to $4,499	20.547	.256	1.24
$4,500 to $5,999	24.871	.274	1.10
$6,000 to $8,999	44.091	.364	.83
$9,000 to $11,999	44.574	.369	.83
$12,000 to $14,999	46.680	.505	1.08
$15,000 to $17,999	65.641	.598	.91
$18,000 to $24,999	76.435	.717	.94
$25,000 to $49,999	168.650	1.137	.67
$50,000 to $74,999	185.643	1.615	.87
$75,000 to $99,999	315.395	3.609	1.14
$100,000 to $149,999	265.433	3.732	1.41
$150,000 or more	831.170	11.205	1.35
No Answer	75.254	.521	.69
Total	119.008	.998	.84

viduals. This year demand was even slightly less with 13.0 percent of the respondents requiring an average of 2.3 individuals.

A related question was asked about the "average length of employment for these jobs." The results show that programmers stay on the job an average of 35.8 months, while systems analysts show much more stability with an average term of 49.9 months on the job.

'Top MIS official' gets highest salary, according to the survey

As would be expected the highest weekly salary is paid to the "top MIS official" (01) with a national average of $913. The 75th percentile average (top 25 percent) for this category is $1,014 per week. For this category, the respondents were asked to fill-in the actual title of the person holding this position. "Director of MIS" was the most prevalent. Numerous mentions were given to vice president of MIS or information systems. Financial titles were mentioned frequently among many other wide-ranging titles.

A group of questions dealt with reporting responsibilities of various

... continued on page 36

Number of Employees In DP vs. Company
(By Equipment Rental)

Rental Range Per Month	Average Number In DP	Average Number In Company
Under $3,000	4	273
$3,000 to $4,499	5	376
$4,500 to $5,999	7	461
$6,000 to $8,999	7	479
$9,000 to $11,999	9	500
$12,000 to $14,999	12	713
$15,000 to $17,999	15	741
$18,000 to $24,999	18	1,039
$25,000 to $49,999	30	1,788
$50,000 to $74,999	36	3,731
$75,000 to $99,999	69	4,837
$100,000 to $149,999	101	8,552
$150,000 or more	250	8,827
Not Available	18	388
Total	21	1,084

Data Processing Reports to:

Financial Officer/ Controller	37.0%
President, Owner, General Manager	31.1%
Vice President	14.0%
Director of Information Systems (MIS)	9.8%
Other	8.1%

Data Base Management Reports to:

Data Processing Manager	32.4%
Director of Information Systems (MIS)	25.5%
Financial Officer/ Controller	16.2%
President, Owner, General Manager	15.2%
Vice President	4.7%
Other	6.1%

Have Person With Title of EDP Auditor

Yes	92.2%
No	7.8%
TOTAL	100.0%

managers. When asked to whom does the DP manager report, it was discovered to be: financial officer, 37.0 percent of the time; top management, 31.1 percent; a vice president, 14.0 percent; MIS, 9.8 percent, and others, 8.1. When compared to 1981, the primary shifts are away from the financial officers and "others" to top management, MIS and vice presidents.

"The strong influence of DP/MIS over the communications function is probably the result of the growing use of data communications and on-line computers."

When asked who is responsible for data communications, it was shown that the combined functions of DP and MIS are in control 82.3 percent of the time. The communications manager was mentioned only 5.5 percent of the time. This is a shift of a few points from last year in favor of the DP/MIS function, 79.9 percent, and away from the communications manager, 7.7 percent. When asked to whom does the communication manager report, it was the DP or MIS function, 56.4 percent of the time. This is about the same as in 1981. The strong influence of DP/MIS over the communications function is probably the result of the growing use of data communications and on-line computers.

"The lower figure indicates that the recession could have had a deflationary effect on weekly salaries."

When asked if costs for user systems are included in DP budget, 32.8 percent said yes. This was an increase from 26.9 percent that answered in the affirmative in 1981.

A new question dealt with data security responsibility. Only 2.2 percent indicated a person on staff with full-time responsibility for data security. However, 42.9 percent said a staff member had part-time responsibility, while another 8.8 percent said they plan to assign the responsibility within the next year.

Overall budget breakouts stayed about the same in 1982. The percentages for each category were: outside services, 7.4; software, 6.7; hardware and maintenance, 29.8; personnel, 44.3; supplies, 8.0; and other, 3.8.

Charts continued on page 38

1981 REVENUES AND OPERATING BUDGET vs. DP BUDGET (By Industry)

Industry	Total Revenues (in millions)	Total Operating Budget (in millions)	Average DP Budget (in Millions)	% of Revenue	% of Budget
Advertising, Printing, Publishing	57.499	51.271	.930	1.62	1.81
Banking, Financial	166.144	120.146	2.430	1.46	2.02
Educational	114.962	115.996	1.866	1.62	1.61
Engineering-Construction	31.105	8.540	.192	.62	2.25
Gov't Agencies (Fed., State, City)	120.837	61.724	1.322	1.09	2.14
Hospital-Health Care	41.694	41.665	.650	1.56	1.56
Insurance	93.879	25.139	1.402	1.49	5.58
Public Utilities	844.588	623.178	12.124	1.44	1.95
Retail Sales & Distribution	42.714	31.571	.371	.87	1.18
Service—Data Processing	1.172	1.088	.562	48.0	51.65
Service—Other than DP	15.465	12.338	.403	2.61	3.27
Transportation	100.051	96.765	.952	.95	.98
Wholesale Sales & Distribution	75.143	62.873	.608	.81	.97
Manufacturing and Processing					
Electrical, Electronic	34.286	20.570	.493	1.44	2.40
Food, Tobacco, Drugs	113.936	48.078	.433	.38	.90
Machinery, Instruments, Equipment	35.101	21.749	.351	1.00	1.61
Metal Producing and Fabricating	37.248	31.085	.443	1.19	1.43
Apparel, Textiles	49.091	42.131	.592	1.21	1.41
Lumber, Wood, Furniture, Paper	33.213	14.430	.271	.82	1.88
Chemicals, Petroleum, Coal	173.500	97.209	1.092	.63	1.12
Rubber, Leather, Glass or Clay Products	53.607	43.349	.314	.59	.72
Other	80.375	67.250	.769	.96	1.14
Total	82.533	58.668	1.085	1.31	1.85

Data Communications Reports to:

Data Processing Manager	22.8%
Director of Information Systems (MIS)	33.6%
President, Owner, General Manager	18.1%
Vice President	3.4%
Financial Officer/ Controller	8.7%
Other	13.4%

Person Responsible for Data Communications

Data Processing Manager	62.2%
Director of Information Systems (MIS)	20.1%
Communications Manager	5.5%
Other	12.2%

Job Descriptions Available

Detailed job descriptions for the 35 DP positions surveyed are available free of charge. For a copy enter No. 21 on the Reader Information Card.

Additional Reprints

Additional copies of the DP Salary Survey in this issue are available for $5 each. In quantities of 10 or more, the cost is $4.50. Send your check or company purchase order to the Salary Reprint Department, INFOSYSTEMS, Hitchcock Building, Wheaton, IL 60187.

Weekly Salaries for All Infosystems Jobs: Nationwide and by Size of Installation

Job Description	Job Code	NATIONAL STATISTICS										AVERAGE SALARY—BY EQUIPMENT RENTAL RANGE												
		Number Reported	Lowest Reported Actual Salary	25th Percentile* Actual Salary	National Average Actual Salary	Median* Actual Salary	Mode* Actual Salary	75th Percentile* Actual Salary	Highest Reported Actual Salary	Established Salary Range—Average Low	Established Salary Range—Average High	Under $3,000/Mo.	$3,000-4,499/Mo.	$4,500-5,999/Mo.	$6,000-8,999/Mo.	$9,000-11,999/Mo.	$12,000-14,999/Mo.	$15,000-17,999/Mo.	$18,000-24,999/Mo.	$25,000-49,999/Mo.	$50,000-74,999/Mo.	$75,000-99,999/Mo.	$100,000-149,999/Mo.	$150,000 and over
MANAGEMENT												(171)	(140)	(107)	(139)	(89)	(95)	(68)	(75)	(115)	(38)	(18)	(19)	(32)
Top MIS Official	(01)	185	480	750	913	913	961	1,014	1,634	752	1,091	799	773	1,038	802	828	829	908	763	916	1,058	1,127	988	1,129
Data Base Systems	(02)	66	259	576	655	673	576	751	1,105	557	785	438	**	**	590	**	539	607	648	635	673	671	750	768
Data Processing	(03)	953	250	540	660	653	576	769	1,288	567	808	517	580	607	626	632	635	690	722	760	777	849	797	832
Ass't D.P.	(04)	143	200	520	624	621	688	750	961	518	729	460	524	496	498	594	560	568	638	678	688	730	699	745
Project/Team Leader																								
Leader	(05)	443	323	543	613	604	576	684	942	522	731	555	528	628	611	637	576	613	567	604	555	610	667	644
Systems Ana'ysis and Programming																								
Manager/Supervisor	(06)	350	380	576	652	650	673	730	1,096	553	791	539	549	587	592	617	676	625	562	677	678	696	723	668
Lead	(07)	716	312	528	591	580	673	673	1,153	465	668	451	446	492	458	535	627	567	502	576	660	543	556	595
Senior	(08)	973	200	442	505	488	480	576	961	417	599	448	434	474	449	478	535	496	464	514	544	509	477	522
Junior	(09)	670	200	326	387	384	384	442	586	341	491	352	345	337	344	350	427	399	407	411	477	350	357	374
Systems Analysis																								
Manager/Supervisor	(10)	47	288	576	650	673	769	748	973	550	756	521	**	**	**	**	**	**	566	667	723	640	668	710
Lead	(11)	109	346	559	604	596	673	673	865	493	690	466	**	**	**	**	551	639	494	603	552	559	600	664
Senior	(12)	225	259	490	536	540	576	596	819	452	641	**	438	571	545	507	537	546	476	530	514	516	532	579
Junior	(13)	115	221	311	378	365	311	458	719	378	544	**	**	395	426	474	425	519	349	430	426	423	328	465
Systems Programming																								
Manager/Supervisor	(20)	89	387	576	662	653	769	750	1,019	551	768	**	**	**	465	**	585	562	587	644	670	652	**	791
Lead	(21)	102	326	510	575	576	576	672	850	473	671	**	**	**	403	**	541	503	516	563	569	648	556	661
Senior	(22)	224	265	436	507	519	576	576	769	428	617	348	514	445	327	480	461	487	470	534	525	532	502	574
Junior	(23)	150	160	285	380	376	221	461	673	364	517	282	**	**	293	**	418	463	366	447	495	508	398	491
Trainee	(24)	84	153	192	279	280	221	374	530	316	441	244	**	322	**	**	**	**	**	397	**	338	347	334
Applications Programming																								
Manager/Supervisor	(25)	95	307	520	625	601	480	730	948	524	742	482	**	**	**	502	549	554	609	609	658	648	713	755
Lead	(26)	201	260	461	534	524	480	615	865	461	634	420	486	**	**	440	431	493	507	496	535	538	636	637
Senior	(27)	619	230	381	455	450	480	523	693	383	527	389	412	463	449	431	422	433	400	447	450	460	406	559
Junior	(28)	588	155	308	365	365	384	405	738	320	447	335	318	365	331	338	358	341	351	372	415	382	398	407
Trainee	(29)	244	138	256	300	305	326	345	519	282	387	270	240	268	292	271	269	318	273	306	326	356	328	372
Data Communications																								
Manager	(30)	40	307	384	526	523	673	668	828	454	650	415	**	**	**	**	307	**	459	558	**	578	480	580
Operator	(31)	49	200	288	334	346	361	351	461	281	415	**	**	**	200	**	275	359	452	309	394	**	**	340
Computer Operations																								
Manager/Supervisor	(32)	425	205	365	465	460	346	542	925	413	585	338	351	460	379	412	434	461	464	514	496	594	570	637
Lead Operator	(33)	507	150	269	335	326	269	384	709	293	415	291	276	306	289	316	308	343	348	360	431	394	484	499
Senior Operator	(34)	917	176	259	302	300	346	337	513	262	376	281	270	289	285	275	293	301	306	307	326	373	382	452
Junior Operator	(35)	724	130	220	252	250	230	280	520	261	367	242	228	258	233	236	241	271	248	257	290	346	355	376
I/O Control Manager	(36)	184	153	241	309	288	307	351	788	228	324	**	**	242	209	272	287	310	264	317	300	392	384	427
Tape Librarian	(40)	110	173	226	266	255	250	290	459	224	316	**	**	227	**	226	249	279	240	263	266	279	310	280
Key Entry																								
Supervisor	(41)	309	153	240	289	278	250	326	646	253	353	274	306	282	256	296	304	291	283	333	332	343	311	335
Lead Operator	(42)	385	150	220	257	250	250	285	515	219	305	251	239	245	225	269	281	269	243	263	293	295	289	300
Senior Operator	(43)	1,256	100	207	236	230	230	260	438	206	285	234	224	236	216	227	239	252	233	245	250	264	263	249
Junior Operator	(44)	695	117	182	209	211	219	230	323	184	256	205	206	192	185	192	236	214	197	213	218	238	206	220

— (No. Firms)

* Median—A figure having an equal number above and below
* Mode—The salary reported most often
* 25th Percentile—That point at which 25% of all other salaries are lower and 75% are higher
* 75th Percentile—That point at which 75% of all other salaries are lower and 25% are higher

** Indicates insufficient information available

AVERAGE REPORTED WEEKLY SALARIES FOR ALL INFOSYSTEMS JOBS BY INDUSTRY

Manufacturing and Processing

Job Description	Job Code	Advertising, Printing & Publishing	Banks, Financial	Educational	Engineering, Construction	Governmental Agencies	Hospital, Health Care	Insurance	Public Utilities	Retail Sales & Distrib.	Data Proc. Service Centers	Other Services (non-DP)	Transportation	Wholesale Sales & Distrib.	Electrical, Electronic	Food, Tobacco, Drugs	Machinery, Instruments, Equip.	Metal Producing & Fab.	Apparel, Textiles	Lumber, Wood, Furn., Paper	Chemicals, Petro, Coal	Rubber, Leather, Glass, Clay	Other
MANAGEMENT		(37)	(53)	(87)	(36)	(101)	(44)	(52)	(11)	(52)	(66)	(83)	(32)	(87)	(44)	(32)	(73)	(92)	(14)	(21)	(31)	(21)	(37)
Top MIS Official	(01)	925	1,027	816	998	873	767	925	1,129	1,027	820	996	1,002	873	839	961	818	839	1,249	968	1,077	930	1,046
Data Base Systems	(02)	658	**	634	**	709	651	694	**	687	**	581	**	676	691	634	510	627	**	**	650	**	**
Data Processing	(03)	674	732	640	712	693	652	668	874	648	650	617	691	578	669	687	638	646	694	651	687	574	656
Ass't D.P.	(04)	628	**	602	562	659	618	608	813	465	**	461	548	552	519	613	523	**	534	530	**	**	589
Project/Team Leader																							
Leader	**(05)**	**668**	**615**	**528**	**582**	**597**	**581**	**568**	**680**	**610**	**615**	**608**	**657**	**606**	**667**	**607**	**699**	**571**	**	**553**	**642**	**526**	**622**
Systems Analysis and Programming																							
Manager/Supervisor	(06)	632	687	596	644	686	643	580	**	648	682	604	681	645	700	585	696	619	650	629	726	670	600
Lead	(07)	569	651	564	534	576	586	520	**	491	525	528	594	523	546	494	541	511	636	477	634	480	549
Senior	(08)	461	541	478	491	516	529	429	468	481	464	469	563	471	536	467	530	485	595	443	504	407	444
Junior	(09)	366	440	407	396	346	370	366	467	365	370	369	413	400	466	429	430	402	465	346	411	351	324
Systems Analysis																							
Manager/Supervisor	**(10)**	**	**690**	**545**	**	**726**	**717**	**656**	**	**	**527**	**	**	**615**	**	**	**	**	**653**	**	**692**	**	**
Lead	**(11)**	**	**657**	**489**	**	**618**	**	**532**	**	**576**	**	**526**	**	**593**	**538**	**	**	**	**	**504**	**552**	**	**593**
Senior	**(12)**	**566**	**552**	**466**	**557**	**543**	**564**	**471**	**	**538**	**481**	**451**	**436**	**538**	**	**594**	**573**	**527**	**478**	**494**	**548**	**	**580**
Junior	**(13)**	**543**	**439**	**416**	**384**	**313**	**452**	**	**	**	**362**	**419**	**	**	**	**524**	**	**453**	**	**	**403**	**	**488**
Systems Programming																							
Manager/Supervisor	(20)	**	675	636	704	752	677	654	700	649	633	**	586	647	**	586	554	609	**	629	600	**	**
Lead	(21)	569	597	612	688	621	573	557	**	552	563	**	539	571	547	515	503	487	**	532	595	**	**
Senior	(22)	531	576	507	528	556	416	449	615	510	422	**	519	452	468	434	491	457	450	500	533	540	467
Junior	(23)	452	**	389	359	303	360	412	487	401	328	**	484	327	404	379	451	269	384	409	418	**	345
Trainee	(24)	**	437	284	**	269	**	282	**	382	281	**	298	324	309	**	338	301	295	**	276	**	**
Applications Programming																							
Manager/Supervisor	**(25)**	**592**	**681**	**629**	**559**	**676**	**617**	**689**	**	**586**	**604**	**	**576**	**673**	**661**	**654**	**576**	**520**	**538**	**	**516**	**	**576**
Lead	**(26)**	**475**	**570**	**601**	**543**	**626**	**433**	**563**	**483**	**448**	**465**	**	**476**	**453**	**522**	**533**	**444**	**480**	**432**	**480**	**514**	**389**	**
Senior	**(27)**	**419**	**495**	**425**	**538**	**494**	**410**	**421**	**431**	**406**	**456**	**433**	**461**	**441**	**456**	**451**	**421**	**434**	**417**	**415**	**424**	**355**	**536**
Junior	**(28)**	**372**	**349**	**372**	**416**	**373**	**392**	**374**	**408**	**345**	**331**	**364**	**384**	**361**	**383**	**416**	**349**	**345**	**316**	**317**	**351**	**304**	**354**
Trainee	**(29)**	**327**	**303**	**272**	**247**	**306**	**305**	**278**	**270**	**321**	**269**	**308**	**343**	**262**	**336**	**330**	**314**	**314**	**250**	**233**	**332**	**246**	**
Data Communications																							
Manager	(30)	**	605	518	**	561	461	**	**	**	**	384	**	465	**	**	586	577	**	578	**	**	538
Operator	(31)	**	**	331	326	342	**	357	**	**	346	**	**	230	**	**	346	377	**	**	**	**	**
Computer Operations																							
Manager/Supervisor	**(32)**	**463**	**505**	**506**	**458**	**537**	**463**	**483**	**550**	**462**	**406**	**410**	**448**	**405**	**494**	**426**	**425**	**440**	**498**	**531**	**470**	**435**	**451**
Lead Operator	**(33)**	**323**	**347**	**340**	**334**	**392**	**327**	**331**	**455**	**328**	**298**	**302**	**392**	**302**	**330**	**331**	**313**	**319**	**319**	**379**	**323**	**333**	**366**
Senior Operator	**(34)**	**309**	**310**	**305**	**299**	**320**	**291**	**281**	**340**	**291**	**284**	**281**	**335**	**274**	**291**	**285**	**296**	**299**	**274**	**315**	**318**	**264**	**298**
Junior Operator	**(35)**	**243**	**256**	**249**	**240**	**260**	**263**	**256**	**265**	**250**	**218**	**248**	**251**	**225**	**249**	**253**	**256**	**261**	**196**	**288**	**264**	**247**	**241**
I/O Control Manager	**(36)**	**375**	**281**	**270**	**294**	**306**	**290**	**378**	**	**329**	**300**	**313**	**295**	**301**	**278**	**313**	**286**	**305**	**279**	**350**	**345**	**	**295**
Tape Librarian	**(40)**	**238**	**245**	**284**	**196**	**275**	**279**	**237**	**	**254**	**234**	**260**	**285**	**237**	**	**239**	**	**300**	**	**234**	**309**	**	**
Key Entry																							
Supervisor	(41)	334	277	275	**	265	311	303	**	289	272	316	357	291	335	308	272	310	317	293	317	270	333
Lead Operator	(42)	242	267	268	272	244	237	251	**	238	258	262	344	230	270	239	261	264	252	241	281	247	253
Senior Operator	(43)	226	223	219	251	239	229	222	265	218	223	246	249	223	245	236	250	247	226	231	249	235	232
Junior Operator	(44)	183	190	193	212	232	210	207	239	185	171	207	219	191	220	200	207	209	200	218	242	217	194

(No. Firms)

Average Reported Weekly Salaries for All Infosystems by Industry

AVERAGE REPORTED WEEKLY SALARIES FOR ALL INFOSYSTEMS JOBS BY GEOGRAPHIC AREA

Region and Metropolitan Area

Job Description	Job Code	New England ME, VT, NH, MA, CT, RI	Boston	Hartford	Mid Atlantic NY, PA, NJ	Albany	Buffalo/Syracuse	Jersey City/Newark	New York	Philadelphia	Pittsburgh	Rochester	So. Atlantic WV, MD, DE, VA, NC, SC, GA, FL, DC	Atlanta	Baltimore	Charleston/Richmond/Roanoke	Charlotte/Raleigh	Jacksonville/Orlando/Tallahassee	Miami	Washington, DC	East North Central WI, MI, IL, IN, OH	Chicago	Cincinnati	Cleveland	Columbus	Dayton	Detroit	Grand Rapids	Indianapolis	Milwaukee
MANAGEMENT		(40)	(25)	(10)	(146)	(9)	(19)	(14)	(46)	(32)	(14)	(12)	(136)	(25)	(16)	(21)	(17)	(19)	(14)	(24)	(335)	(114)	(30)	(29)	(18)	(17)	(15)	(13)	(23)	(48)	← (No. Firms)
Top MIS Official	(01)	919	949	**	943	**	894	790	1,094	824	1,080	753	994	1,026	965	**	1,035	714	1,016	1,105	827	854	793	**	**	708	1,148	768	798	832
Data Base Systems	(02)	689	689	**	666	**	**	**	640	654	600	**	688	**	**	**	586	567	695	740	605	661	**	**	**	**	**	**	**	579
Data Processing	(03)	689	699	647	669	674	537	696	751	674	509	662	637	628	617	628	602	539	729	728	637	665	634	676	655	623	588	551	565	636
Asst D.P.	(04)	**	**	**	571	646	521	540	543	653	**	**	627	607	**	**	**	**	565	658	585	552	619	**	**	605	**	**	**	575
Project/Team Leader																														
Leader	(05)	627	635	592	658	497	**	**	709	592	4?8	589	603	642	**	519	523	588	672	659	623	697	532	547	**	529	539	**	648	565
Systems Analysis and Programming																														
Manager/Supervisor	(06)	712	695	**	649	673	498	730	664	694	602	546	678	647	650	599	624	646	722	819	604	622	611	642	639	**	**	523	642	564
Lead	(07)	634	585	**	565	550	**	663	622	543	508	529	566	523	**	465	455	489	606	671	533	571	487	514	472	427	595	**	560	488
Senior	(08)	495	502	485	532	428	435	577	577	464	475	478	526	482	450	436	415	421	560	612	466	512	412	450	414	385	577	346	476	444
Junior	(09)	368	378	306	410	391	331	**	420	354	379	392	393	404	372	369	381	344	432	435	357	393	359	394	374	306	414	288	304	375
Systems Analysis																														
Manager/Supervisor	(10)	**	**	**	618	**	**	**	556	541	**	**	669	**	**	645	685	**	**	**	736	**	**	**	**	**	**	**	769	**
Lead	(11)	571	571	**	549	553	**	692	429	**	**	557	572	538	**	614	593	**	**	707	669	624	**	681	**	656	**	**	670	**
Senior	(12)	504	514	466	505	384	**	597	417	504	**	**	508	519	**	527	483	**	515	**	550	582	497	614	**	451	**	**	565	500
Junior	(13)	381	**	**	372	**	**	325	331	**	**	**	436	454	**	**	446	392	**	**	433	447	**	**	**	405	**	**	426	447
Systems Programming																														
Manager/Supervisor	(20)	784	788	**	685	**.	623	692	734	709	**	**	707	739	**	624	576	**	**	**	585	621	**	**	**	512	**	**	576	595
Lead	(21)	611	614	**	530	540	**	632	612	473	**	**	552	**	**	491	**	476	555	**	538	566	537	**	**	**	**	**	557	557
Senior	(22)	520	540	**	487	**	**	583	541	429	**	488	519	533	**	487	488	408	518	**	482	514	396	475	437	488	424	**	550	440
Junior	(23)	473	510	**	348	**	335	493	442	332	**	**	468	514	**	451	**	**	423	**	374	387	340	326	347	414	**	**	411	404
Trainee	(24)	305	**	**	270	**	**	**	**	291	**	**	354	390	**	**	**	**	**	**	326	355	**	**	**	**	**	**	**	**
Applications Programming																														
Manager/Supervisor	(25)	683	695	**	587	598	**	576	556	616	550	**	513	**	**	613	**	**	**	**	565	486	531	**	**	575	**	**	657	582
Lead	(26)	583	594	**	509	507	**	515	542	459	396	527	571	**	**	492	**	472	541	643	433	445	470	493	**	**	**	**	398	382
Senior	(27)	436	431	412	431	366	357	423	512	404	391	456	481	409	444	388	361	403	473	548	413	429	404	441	393	429	460	442	372	349
Junior	(28)	377	384	345	362	340	289	388	385	333	325	352	352	393	**	314	308	308	383	401	333	333	305	382	305	349	365	330	332	309
Trainee	(29)	309	299	336	282	278	**	321	326	317	300	**	321	384	288	277	263	**	290	343	296	318	262	325	253	**	340	273	313	224
Data Communications																														
Manager	(30)	605	**	**	465	**	**	**	393	462	**	**	589	**	**	**	**	**	**	499	613	516	**	**	**	**	**	**	**	**
Operator	(31)	377	**	**	273	**	**	**	288	**	**	**	333	**	**	246	241	**	361	240	369	**	**	**	**	**	**	**	**	373
Computer Operations																														
Manager/Supervisor	(32)	493	491	498	476	511	**	468	486	446	**	468	466	476	364	467	445	416	575	504	449	473	470	431	459	471	**	346	474	421
Lead Operator	(33)	295	294	300	324	319	292	348	367	322	287	286	339	354	272	317	301	316	391	362	315	320	310	322	288	313	369	244	312	310
Senior Operator	(34)	281	288	275	308	302	265	307	335	319	283	264	302	320	265	279	268	281	331	336	297	307	305	293	299	263	313	262	308	272
Junior Operator	(35)	229	247	234	238	242	250	264	228	242	226	230	255	244	212	226	238	242	292	304	248	265	234	217	205	210	252	226	249	261
I/O Control Manager	(36)	264	268	250	333	**	**	380	319	257	**	288	302	363	216	341	323	249	341	301	298	306	**	264	**	304	256	246	291	**
Tape Librarian	(40)	278	278	**	257	250	**	269	265	294	**	215	238	256	226	235	207	**	259	308	273	294	**	251	**	**	215	**	244	**
Key Entry																														
Supervisor	(41)	287	294	261	284	301	270	339	313	267	308	309	257	284	266	314	279	219	321	348	302	323	340	320	275	280	284	307	305	274
Lead Operator	(42)	261	275	252	254	221	215	251	275	253	240	221	238	268	232	222	251	208	274	320	245	265	225	257	244	230	278	241	227	269
Senior Operator	(43)	231	232	221	225	214	204	238	234	221	207	210	232	218	201	205	203	199	254	288	237	253	206	237	224	226	247	206	211	240
Junior Operator	(44)	221	224	216	196	204	167	200	208	172	180	207	201	202	190	196	181	197	226	235	210	229	168	184	211	222	212	182	192	204

** Indicates insufficient information available

Average Reported Weekly Salaries for All Infosystems Jobs by Geographic Area

AVERAGE REPORTED WEEKLY SALARIES FOR ALL INFOSYSTEMS JOBS BY GEOGRAPHIC AREA

Region and Metropolitan Area

Job Description	Job Code	Rockford	East South Central KY, TN, MS, AL Memphis	Nashville	West North Central ND, MN, SD, NB, IA, KS, MO Des Moines	Kansas City KS, MO	Lincoln/Omaha	Minn./St. Paul	St. Louis/E. St. Louis	West South Central TX, OK, AR, LA Austin/San Antonio	Dallas/Ft. Worth	Houston	New Orleans	Oklahoma City	Mountain UT, MT, ID, NV, WY, CO, AZ, NM Denver	Phoenix	Pacific WA, OR, CA Los Angeles	Portland	San Diego	San Francisco/Oakland	Seattle/Tacoma	National Average Comparison 1981	1982	% Increase/ Decrease
MANAGEMENT		(10)	(23)	(5)	(10)	(108)	(9)	(24)	(13)	(37)	(25)	(92)	(18)	(35)	(15)	(15)	(9)	(52)	(26)	(18)	(169)	(64)	(21)	(19)	(37)	(28)
Top MIS Official	(01)	**	1,086	**	**	860	760	862	917	949	**	981	932	990	1,054	1,038	**	785	698	914	941	984	826	**	979	973	868	913	5.2
Data Base Systems	(02)	513	**	**	**	635	**	531	**	**	**	764	748	**	**	**	**	569	672	**	631	**	**	**	660	**	558	655	17.4
Data Processing	(03)	650	641	692	636	622	630	634	712	628	550	741	702	712	806	778	743	694	699	712	672	697	596	624	720	618	601	660	9.8
Ass't D P	(04)	536	**	**	**	553	**	621	660	436	**	637	653	547	**	645	**	561	550	584	636	**	470	**	690	588	544	624	14.7
Project/Team Leader																													
Leader	**(05)**	**	**571**	**614**	**576**	**520**	**538**	**520**	**509**	**509**	**485**	**656**	**712**	**582**	**571**	**687**	**680**	**566**	**560**	**564**	**654**	**700**	**527**	**	**664**	**645**	**595**	**613**	**3.0**
Systems Analysis and Programming																													
Manager/Supervisor	(06)	536	595	**	573	615	588	675	642	598	**	679	641	678	736	723	554	728	680	779	694	711	660	**	663	707	639	652	2.0
Lead	(07)	**	592	563	**	497	493	512	511	486	455	603	565	663	649	625	**	542	531	589	663	668	**	**	557	598	526	591	12.4
Senior	(08)	527	481	506	463	457	427	490	419	477	451	504	458	514	584	583	532	525	499	465	536	581	387	519	510	498	465	505	8.6
Junior	(09)	**	418	**	418	369	315	365	377	367	411	345	303	421	**	365	505	422	425	402	449	490	263	402	392	388	404	387	−4.2
Systems Analysis																													
Manager/Supervisor	**(10)**	**	**	**	**	**648**	**	**661**	**	**	**	**649**	**599**	**615**	**	**795**	**	**741**	**	**	**628**	**	**538**	**	**593**	**	**652**	**650**	**−0.3**
Lead	**(11)**	**	**	**	**	**488**	**	**538**	**	**451**	**	**587**	**566**	**593**	**	**749**	**	**646**	**	**	**599**	**669**	**	**	**583**	**	**563**	**604**	**7.3**
Senior	**(12)**	**	**520**	**	**498**	**470**	**	**433**	**549**	**431**	**479**	**578**	**556**	**590**	**	**604**	**	**579**	**611**	**427**	**552**	**609**	**495**	**453**	**543**	**568**	**505**	**536**	**6.1**
Junior	**(13)**	**	**354**	**	**354**	**455**	**	**392**	**439**	**	**	**313**	**301**	**	**489**	**	**	**503**	**503**	**	**428**	**	**488**	**	**369**	**	**402**	**378**	**−6.0**
Systems Programming																													
Manager/Supervisor	(20)	**	662	**	**	605	658	493	**	570	**	698	682	606	**	759	**	680	**	590	645	667	557	**	**	**	614	662	7.8
Lead	(21)	**	562	**	**	562	596	**	**	559	580	623	540	555	**	679	**	625	**	**	615	**	541	**	**	**	567	575	1.4
Senior	(22)	525	486	526	**	476	441	424	**	481	528	548	507	520	511	618	**	570	605	550	534	**	404	421	568	522	459	507	10.5
Junior	(23)	**	406	**	**	385	359	**	**	420	354	300	269	466	449	551	**	401	485	305	444	513	**	**	403	**	392	380	−3.1
Trainee	(24)	**	384	**	**	288	**	**	**	**	**	286	247	360	429	375	**	358	379	**	303	288	**	**	310	**	342	279	−18.4
Applications Programming																													
Manager/Supervisor	**(25)**	**576**	**	**	**	**660**	**	**620**	**582**	**	**	**759**	**	**620**	**	**852**	**	**636**	**	**	**564**	**595**	**	**	**590**	**	**656**	**625**	**−4.7**
Lead	**(26)**	**525**	**479**	**	**480**	**524**	**	**502**	**	**535**	**487**	**659**	**	**481**	**563**	**735**	**	**496**	**	**488**	**534**	**579**	**	**	**545**	**	**515**	**534**	**3.7**
Senior	**(27)**	**407**	**416**	**406**	**417**	**414**	**369**	**399**	**492**	**350**	**421**	**506**	**396**	**464**	**545**	**537**	**484**	**487**	**529**	**453**	**473**	**510**	**473**	**407**	**515**	**459**	**423**	**455**	**7.6**
Junior	**(28)**	**342**	**325**	**355**	**287**	**369**	**325**	**347**	**437**	**307**	**328**	**400**	**323**	**383**	**443**	**416**	**415**	**408**	**421**	**350**	**385**	**393**	**416**	**364**	**367**	**375**	**349**	**365**	**4.6**
Trainee	(29)	250	267	294	**	270	**	264	273	**	243	297	308	288	**	293	**	349	349	**	293	256	310	264	355	306	284	300	5.6
Data Communications																													
Manager	(30)	**	**	**	**	530	**	**	**	**	**	462	433	**	**	**	**	**	**	**	**	**	**	**	**	**	558	526	−5.7
Operator	(31)	**	**	**	**	**	**	**	**	**	**	338	**	368	**	**	**	346	**	**	388	**	**	**	324	**	326	334	2.5
Computer Operations																													
Manager/Supervisor	**(32)**	**434**	**394**	**516**	**384**	**420**	**503**	**380**	**467**	**433**	**368**	**493**	**541**	**479**	**505**	**505**	**	**515**	**603**	**407**	**496**	**508**	**423**	**468**	**521**	**483**	**442**	**465**	**5.2**
Lead Operator	**(33)**	**370**	**348**	**398**	**350**	**311**	**321**	**293**	**345**	**287**	**339**	**378**	**406**	**360**	**327**	**404**	**338**	**379**	**412**	**317**	**351**	**342**	**321**	**290**	**372**	**405**	**326**	**335**	**2.8**
Senior Operator	**(34)**	**311**	**280**	**288**	**252**	**281**	**268**	**263**	**321**	**276**	**283**	**308**	**281**	**316**	**313**	**331**	**285**	**329**	**374**	**281**	**318**	**323**	**282**	**275**	**335**	**334**	**284**	**302**	**6.3**
Junior Operator	**(35)**	**272**	**257**	**283**	**223**	**230**	**261**	**208**	**236**	**237**	**237**	**260**	**246**	**262**	**298**	**253**	**239**	**268**	**283**	**217**	**276**	**293**	**243**	**234**	**269**	**276**	**244**	**252**	**3.3**
I/O Control Manager	**(36)**	**234**	**433**	**269**	**	**270**	**288**	**273**	**	**326**	**	**292**	**276**	**288**	**327**	**289**	**	**310**	**305**	**325**	**331**	**327**	**	**294**	**329**	**370**	**291**	**309**	**6.2**
Tape Librarian	**(40)**	**269**	**285**	**	**232**	**248**	**198**	**	**	**	**244**	**295**	**294**	**264**	**	**	**	**	**	**	**297**	**281**	**257**	**	**330**	**241**	**249**	**266**	**6.8**
Key Entry																													
Supervisor	(41)	286	312	291	253	314	233	340	357	309	305	286	263	274	378	324	305	318	362	336	319	295	332	298	354	303	303	289	−4.6
Lead Operator	(42)	244	258	288	244	245	**	241	256	258	245	268	244	239	318	275	285	300	309	252	283	281	259	247	299	290	255	257	0.8
Senior Operator	(43)	224	222	219	191	231	200	224	246	222	221	239	215	229	272	215	281	224	237	227	261	255	257	228	278	280	220	236	7.3
Junior Operator	(44)	197	194	184	151	198	**	214	207	178	168	195	190	190	246	187	**	203	212	202	231	223	228	221	246	159	191	209	9.4

← (No. Firms)

** Indicates insufficient information available

Average Reported Weekly Salaries for All Infosystems Jobs by Geographic Area

WP Salary Increases Range from 3.5 to 19 Percent

Use of word processing equipment continues to be shifted to shared-logic, multistation units and in-house minicomputers. Declines in use were noted among memory and mag-card typewriters and stand-alone CRT word processors.

By Frederick W. Miller, Senior Editor and Raymond S. Winkler, Manager of Research

Salaries for people working in the field of word processing showed a modest increase this year compared to the previous year, ranging from 3.5 to 19 percent. This information was reported in the third annual word processing salary and equipment usage survey conducted by INFOSYSTEMS magazine. Specific dollar amounts ranged from increases of $19 per week to $44 per week, survey results indicate.

Surprisingly, however, there were declines in salaries for some job classifications, principally among those with job titles of supervisor, coordinator and lead operator in word processing. The dollar amount declines ranged from $11 per week to $54 per week.

Despite these ups and downs, the three-year trend among all job classifications of word processing workers was up—ranging from just over 10 percent for proofreader to 22 percent for junior word processing operator and 20 percent for word processing supervisor.

When reviewing salary changes related to size of word processing budgets, the survey indicates that the largest increases, by percentage, were given to those with the "proofreader" classification in firms of all sizes. Increases ranged from $40 to $44, or from 20 percent to 27 percent.

For managers of word processing, it was a mixture of salary increases, with ranges of $8 per week, or 1.5 percent, among firms with an annual WP budget of more than $250,000 to $78 per week, or 23 percent, among firms with an annual WP budget under $10,000.

Across-the-board, and speaking quite generally, salary increases among those working in word processing were lower this past year than in previous years.

The highest reported salaries paid remained the same in this survey as in the previous year's for the manager of word processing—$961 per week—but declined for the other top supervisors or lead operator categories. These figures correspond to similar salary changes for the "national average actual salary" in the same categories (see chart: national statistics).

Lower top salaries were reported for word processing supervisor ($692 vs $769), for word processing coordinator ($650 vs $673) and for lead operator ($500 vs $576).

Additional salary information also indicates that the "established salary range" for both average high and average low showed only modest increases, both in dollar amount and percentage of increase. For instance, the average low established salary was increased in a range from 6.47 percent to 10.46 percent, or from $16 to $36 per week. For the average high established salary, the range was from 2.54 percent to 12.82 percent, or from $9 to $54 more per week.

One clear trend was uncovered in the salary and equipment usage survey this year. Many survey respondents said in their comments that they have neither separate word processing departments, nor centralized WP departments. They noted that the word processing function has been integrated into the current job functions such as secretary, administrative assistant, clerk, technical writer, analyst and other similar job titles.

Changes in equipment usage also

Weekly Salaries for Word Processing Jobs: Nationwide

Job Description	NATIONAL STATISTICS									
	Median Reported	Lowest Reported Actual Salary	25th Percentile Actual Salary	Lowest Average Actual Salary	Median Actual Salary	Mean Actual Salary	75th Percentile Actual Salary	Highest Reported Actual Salary	Established Salary Range—Average Low	Established Salary Range—Average High
Manager Of Word Processing	85	213	346	468	451	673	557	961	389	563
Word Processing Supervisor	124	200	294	361	335	315	401	692	306	435
WP Coordinator Or Ass't. Mgr./Supervisor	75	231	253	313	293	250	346	650	263	363
Word Processing Operator, Lead	394	163	230	264	246	246	289	500	232	317
Word Processing Operator, Senior	494	147	216	262	257	280	280	518	215	296
Word Processing Operator, Junior	509	134	211	239	225	225	266	416	193	273
Proofreader	30	175	196	234	230	200	247	475	212	296

Word Processing Equipment Used

Equipment Type	Percent Using
Stand-Alone CRT/floppy disk	39.9
Electronic Memory Typewriter	25.4
with one-line display	9.1
with mag card	6.0
with floppy disk	11.4
Shared Logic, Multistation CRT	32.4
Mag Card Typewriter	20.7
In-House Minicomputer	32.9
Magnetic Tape Typewriter	2.8
In-House Mainframe Computer	10.4
Other	4.9

Percentage is more than 100 because firms with more than one type of equipment checked all types in use.

Word Processing Usage by Industry

Type of Organization	Percent Using
Insurance	81.3
Government (state, fed., local)	83.3
Engineering & Construction	68.4
Food, Tobacco, Drugs	70.5
Hospitals, Health Care	53.6
Electrical Manufacturing	82.3
Transportation	66.7
Lumber, Wood, Furniture, Paper	41.6
Chemicals, Petroleum, Coal	55.5
Public Utilities	71.4
Advertising, Printing, Publishing	63.2
Education	75.0
Machinery, Instruments, Equipment	73.3
Banking & Finance	69.5
Services, Data Processing	64.2
Rubber, Leather, Glass & Clay Products	25.0
Services, Not Data Processing	66.7
Retail Sales & Distribution	43.4
Apparel, Textiles	26.7
Wholesale Sales & Distribution	26.3
Metal Producing & Fabricating	37.2
Other	53.1

Reporting Relationship for WP Function

Reports to	Percent
Director/Manager of Administrative Services	15.7
Director/Manager MIS/Information Services	10.9
President/Owner/General Manager	18.7
Finance Officer	8.0
Director/Manager of Data Processing	7.2
Manager of Secretarial Services	3.2
Other	20.6

Percentage of WP Budget by Size of WP Budget

	Under $10M	$10M To $24.9M	$25M To $49M	$50M To $99M	$100M To $249M	$250M And Over	Total
Personnel	36.0	52.9	56.8	53.2	56.6	55.1	51.5
Equipment & Maint.	34.5	30.3	30.2	32.8	29.1	30.1	31.1
Software	8.1	6.6	4.7	4.5	3.5	4.0	5.4
Supplies	17.8	9.4	7.7	7.9	7.2	7.2	9.7
Outside WP Services	2.0	0.6	0.0	0.6	1.8	0.2	1.2
Other	1.6	0.2	0.6	1.0	1.8	3.4	1.1

Job Descriptions Available

Detailed job descriptions of the word processing positions surveyed are available free of charge by entering number 15 on the Reader Information Card.

Word Processing Usage by All Respondents

	Percent
In-House Word Processing	61.0
WP Service Bureau	0.8
WP on Timesharing Service	0.9
WP at Other Location	2.3
No, Plan to within 2 yrs.	20.9
No WP Operation/Function	14.0

Summary of Weekly Salaries by Size of Word Processing Budget

Total Annual WP Budget	No. of Firm Responding	Avg. of Firm Responding	Avg. Salary Supervisor	Avg. Secretary & Asst. Mgr.	Avg. Senior Level	Avg. Mid-Level	Avg. Entry Level	Trainee
Under $10,000	31	411	273	287	261	236	202	**
$10,000 to $24,999	62	412	308	298	262	214	213	197
$25,000 to $49,999	49	449	322	306	282	248	215	220
$50,000 to $99,999	48	467	374	313	284	254	221	237
$100,000 to $249,999	40	473	375	320	286	257	240	240
$250,000 and over	32	529	396	347	334	295	251	242

** Indicates insufficient information available

were noted by survey respondents. Older technologies, such as magnetic card and magnetic tape typewriters, are being replaced by newer systems, such as multi-terminal word processors, or in-house minicomputers that provide word processing.

Only 2.8 percent of those responding said they are using a mag tape typewriter, a sharp decline from 11.2 percent a year ago. But slightly more than one-fourth—25.4 percent—said they still are using some form of electronic memory typewriter, which includes those with a one-line display, mag card or floppy disk storage. This is down slightly from 33.7 percent reported a year ago.

A sharp increase—to 32.9 percent from 25.0 percent—was noted in the firms using an in-house minicomputer for word processing, and a modest increase to 32.4 percent from 31.2 percent was reported among firms using shared-logic, multi-terminal word processors.

Among all firms responding, there was a slight increase in those that said they are using word processing—62.7 vs 61.5. The percentage of responding firms that plan to install word processing within the next two years remained the same at just under 21 percent.

Looking at annual budgets for word processing, respondents indicated a slight decline in the percentage spent on salaries—down to 51.5 percent from 54.6 percent last year and 57.1 percent for the first year the survey was conducted. □

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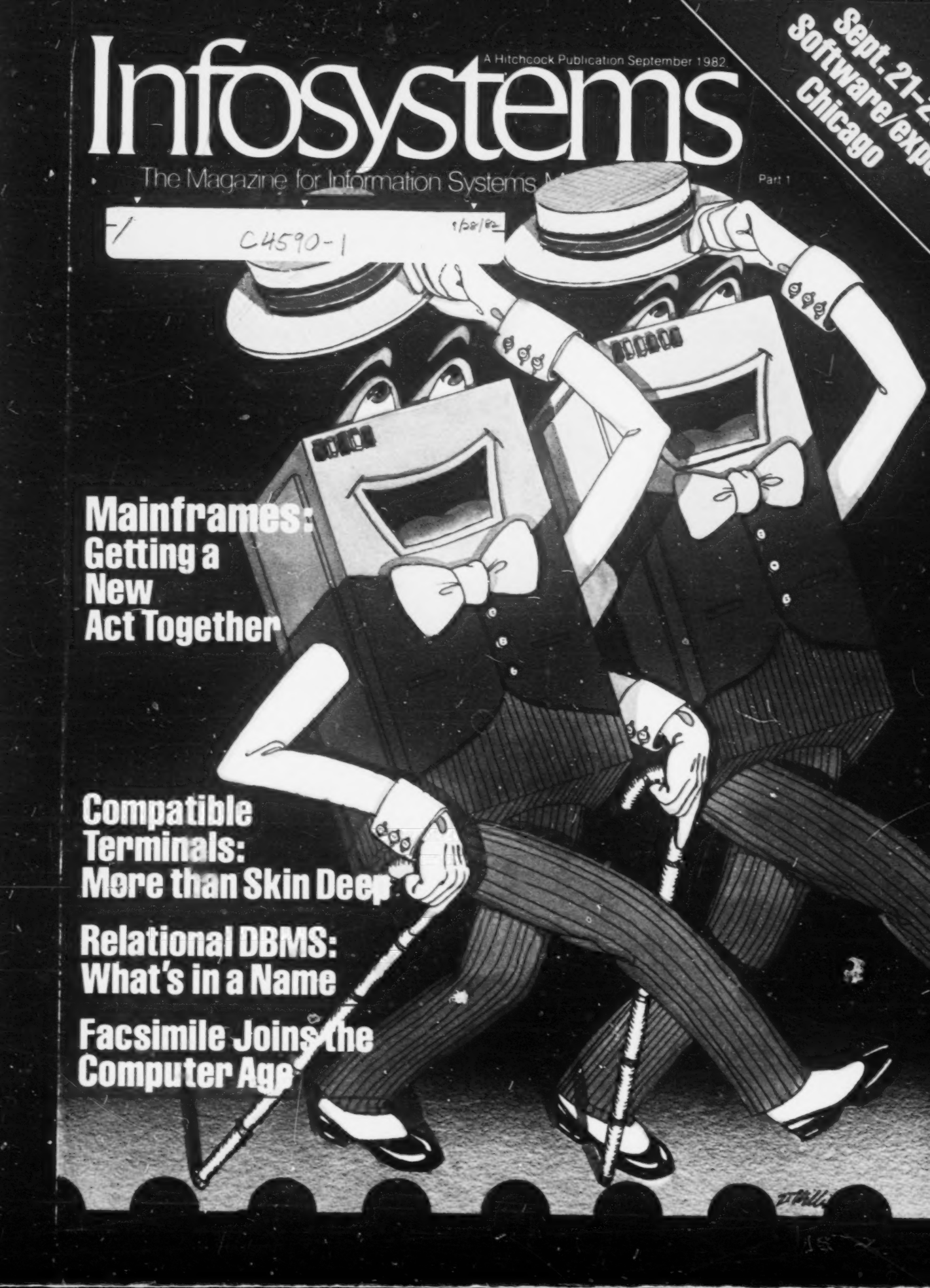

Mainframes: Getting a New Act Together

Compatible Terminals: More than Skin Deep

Relational DBMS: What's in a Name

Facsimile Joins the Computer Age

Infosystems

The Magazine for Information Systems Management

September 1982 Volume 29 Number 9

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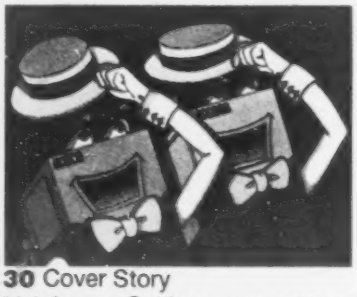

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Mainframes:Getting a new act together
The former headliner of data processing is assuming new roles.

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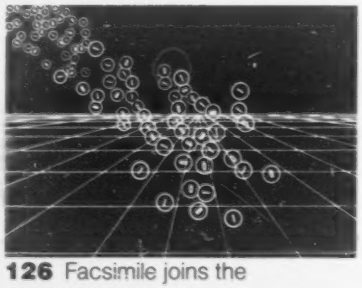

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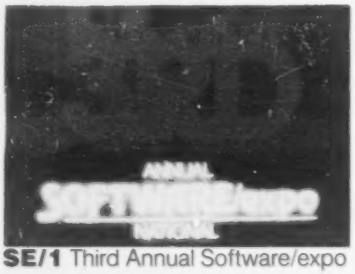

SE/1 Third Annual Software/expo

Coming in October
October will be another headliner issue with features on minis in small business, microcomputer software, manufacturing systems, bill-back systems and a report on INFOSYSTEMS Software/expo-National in Chicago.

ABP

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BPA

Mainframes

Getting a New Act Together

Much like a fading movie star who finds himself portraying bit parts supporting younger, more glamorous performers, the mainframe computer—once the headliner of data processing—has had to assume new roles. Unlike the fading movie star, however, the mainframe finds itself taking on some of the most challenging and notable roles of its career.

By Wayne L. Rhodes Jr., Executive Editor

The mainframe computer which once commanded top billing on the data processing (DP) stage has been forced out of the limelight by younger, more glamorous performers. The minicomputer and the newest ingénue, the microcomputer, now vie for star billing in a concerted effort to upstage the oldest member of the cast. The mainframe's new role may seem to be a bit part supporting these younger stars, but it ultimately could prove to be the most important in helping DP get its act together.

The mainframe computer has traditionally been DP's star. It performed all of an organization's processing roles. It stored and analyzed data, and it projected what things might happen. It was the headliner, performing center stage, supported by an elite cast of DP professionals.

The organization's audience slowly learned to appreciate the mainframe's talents and called for encores and demanded it perform new roles. It responded like a trooper, but eventually either its supporting cast was too small or its own capacity was too limited. Requests backed up and the mainframe's audience became less enamored with the performance.

The minicomputer got its chance and stepped on stage from the wings. The mini made its debut as a less expensive actor who could please the audience with a bag full of tricks. The minicomputer moved the show much closer to the audience, but it still usually needed some DP cast support to ensure its act didn't detract from the organization's overall production.

Before the audience could tire of the mini's performance; however, a brash new talent, the microcomputer, shouldered its way into the act. This actor not only moves the show into the audience, but also allows what had once been passive observers to get into the act themselves. Audience participation dawned.

> "We're finding that the data center, the mainframe, is getting more and more play because it's easier, because we've got the staff."

And what of the older headliner, the mainframe that once had the stage to itself? Do not nostalgically mourn its diminished stature. Critics panned its performance and predicted its retirement from the stage, but that doesn't seem to be its fate for some time to come. Both the mini and micro bring new talents to the show, but neither has the range or depth of character of the mainframe. Organizations that direct the play have come to recognize that each of the actor's talents can enhance those of the others.

Nowhere is this more evident than with the mainframe. Once a batch processor that performed almost of and for itself, it now plays exciting new roles that are reinvigorating the old trooper. It's still processing in batch, to be sure. But it is also serving as a data base machine and a communications processor. It's helping minis and micros distribute processing while retaining organizational control. It's becoming the multidimensional character actor moving subtly from role to role, play to play, going unnoticed by the audience perhaps, but nonetheless essential to the act.

In the process, demands for the mainframe's talents have increased, not subsided. According to users and vendors alike the more the audience learns about computing, the more computing they want. And the more they come to realize that the capacity they need to perform some of their requests resides with the mainframe.

Members of INFOSYSTEMS New York User Council acknowledge that applications demand on their mainframes is growing, despite the addition of smaller machines for remote processing functions. "We're finding that the data center, the mainframe, is getting more and more play because it's easier, because we've got the staff," says Peter F. DeVaux, senior vice president/director of Young & Rubicam Inc.'s corporate information services. "The smart people who know about data processing exist in my staff, not throughout the rest of the organization."

DeVaux explains that MIS (management information systems) at the advertising agency functions as a support, not a strategic activity. He contends that if it were strategic, the whole organization—divisions and companies—would be building DP capabilities. Instead, Young & Rubicam's divisions are building an interface with DP; bringing in people skilled at identifying how the computer can help the organization solve problems.

"But they still come to us for the solution," DeVaux points out. "Then the question becomes what kind of solution do we recommend. Very often we find that the mainframe is very much the easiest. You've got all the tools; you've got the hardware; you've got everything there. You've got the people who know the machine. We find applications are growing on a mainframe. I think that is temporary, but it is happening."

The vice president of research and MIS at Bloomingdale's also finds demand on the mainframe growing. "I guess it depends on how far along you are," comments Robert J. Shinberg. "Different shops are in different generations of their understanding and sophistication in data processing. If you've got a shop that doesn't have their accounts payable or accounts receivable on a computer yet, they've got a long way to go. They still are going to be developing on the mainframe. But as we start thinking about how we can help our organization in its planning functions, we need the data that is already on the files. We've only scratched the surface in the strategic use of the computer. There is a lot of use for the mainframe as the central processor."

Shinberg thinks people shouldn't be stubbing their toes any more on the accounts payable, basic applications. "Now we're trying to figure out how to best use this data that we've picked up to help manage the business," he says. "The planning with the 'what if' functions: the mainframe can still play a big role there. Especially with the way IBM designs its forecasting packages to use billions and billions of cycles. If you don't have something as powerful as the mainframe you're never going to get to the end of the path."

The members of the council discussed new roles they have called upon their mainframes to perform. Norbert Gottenberg, director of information services says his employer, Lehman Bros. Kuhn Loeb Inc., maintains huge financial data bases. That data is downloaded from the mainframe to micros where the users can access it as needed.

The new IBM 3081 Model Group K mainframe offers internal operating speeds up to 40 percent faster than current models, according to the company. Compatible with other large IBM processors, the new 3081, illustrated in a design model, provides up to 24 channels for data transfer.

"We want to make sure we have control over the integrity of the information," Gottenberg emphasizes. "Once it's captured we want to make sure that as we make it available to the rest of the firm there is quality control. The users say, 'I need this series or that series of information. I want to bring it to my micro and I want to play around with graphics or play around with spreadsheets.' So what we have there is the downloading and the consistency of that information."

> "We want to make sure we have control over the integrity of the information. Once it's captured, we want to make sure that as we make it available to the rest of the firm there is quality control."

Gottenberg points out that if one user has a time series, is playing with it and another user needs the same time series, you can't have two different sets of data. "We need to share that commonality," he says. "But you may have different output formats as the result. The point is that the raw data going in came out of a mainframe environment."

Bloomingdale's captures data with minicomputers at its stores during all the hours the stores are open. As soon as the last store closes, the data moves to the mainframe, an IBM 4341. "We do all of our batch processing and we send our reports out to the branch stores," Shinberg states. "Their terminals print at night unattended. When the people come in in the morning their reports are there. But the batch processing is done overnight and then the mainframe sits."

Shinberg says that in effect he has an empty machine during the day. It is only employed for systems development. He stresses, however, that nothing in the definition of his operation dictates batch processing has to be that night. It could be done the next day or anytime before the next cycle starts.

DeVaux, whose operating environment consists of a series of Burroughs 6800s and 6900s lashed together, says his mainframes do interactive work during the day and batch at night.

Bloomingdale's operates the same way, Shinberg says, except it uses minicomputers for the interactive work. "We're doing on-line order entry and we're updating accounts receivable—not really accounts receivable on a financial basis, but on a memo basis—but with dedicated minicomputer systems," he notes. "It's a little different environment."

Ivars Eichvalds, new vice president

of information services, Curtis Circulation Co., West Caldwell, NJ, described the way Simmons Universal applied the mainframe for its order entry and accounts payable as being a little different from Bloomingdale's. He was director of information systems at Simmons before moving to Curtis this summer.

Simmons is heavily batch and on-line oriented during the prime shift hours although it does development work also, according to Eichvalds. The firm allocates goods and schedules production during the day. It handles on-line order entry and receivables through its mainframe. Eichvalds calls it critical for Simmons to update the accounts receivable because credit limits could go over at anytime. Simmons has to watch orders, he declares.

Young & Rubicam, according to DeVaux, plans to ultimately get a Burroughs 5900, an entry-level mainframe, and work it as a communications device. "We'll use it as a front-end so we can dynamically switch pack and programs," DeVaux envisions. "It is interesting when you start to look at the problems of having a lashed together mainframe. You say you don't like the reliability that implies. When it's down, you're down. So you break it up and get back to definitions. What are three 6900s and two 6800s running as separate machines in one room? Is that really a mini network?"

What DeVaux characterizes as explosive growth in computing applications prompted Young & Rubicam to undertake a 10-year plan. The conclusion: The data center gets larger and does more things. "I think the real explosive growth is in minis and micros," he comments. "We figured out that we're going to have four times the computing power on desks as we do in the mainframes in 10 years. You'll see as data processing use continues to grow at fiercesome rates—15 to 30 percent a year depending upon the organization—the top slice of that is going to be the growing piece. And that will be in the micro and mini areas. The data center will continue to grow, though."

Shinberg agrees with DeVaux's predictions. He sees distributed processors, local data entry, local data capture, local editing and some local files. Batch processing will still take place, he believes. Files will pass back and forth between sites either for reports or to support the next day's data entry. He does think most of the work will be done out on the perimeter. "But there will be a role for maintaining integrity, maintaining the files, doing the heavy batch processing in central," he insists. "And I think there's a pretty clear picture that is starting to emerge."

Such farsightedness on the part of their customers has been noted by some vendors. The director of systems requirements for Honeywell's Large Information Systems Division in Phoenix, says the users definitely are driving the mainframe marketplace. Most applications stem from the users inventing new ways to employ computers, according to Honeywell's Jack Ring. He says users appear to be motivated to find ways to improve corporate productivity.

Sperry Univac's newest and most powerful family of computers is the 1100/90 series. According to the company, the 1100/94 multiprocessor provides almost double the speed and memory capacity of IBM's largest system.

"Users are much more articulate now about what they want to have," Ring asserts. "Five to 10 years ago systems analysts would tell you about the nuances on the inside of our machines. You never ran into people who could talk to you about how they can improve their corporate processing if you would do such and such. We're even seeing more of that now at a management level."

Ring says the major new roles of mainframes cover order entry, sales management and product distribution. Behind that comes a wave of factory and engineering automation.

The computers are not only being applied to materials and product industries either. Insurance, one of the oldest users of mainframes, and communications markets have ripened. Most insurance companies have put on-line terminals at their agents sites. The communications industry has big computers handling accounting on-line. "You can get much more accurate accounting information in who talks to whom and for how long," Ring points out. "In some cases, that demands a 20-fold expansion in capacity for accounting of active usage of communication lines."

These larger data base and bigger on-line transactions have had a beneficial effort for mainframes, Ring contends. "Most of our users represent larger chunks of their own enterprises as models within the machines," he says. "They simulate the corporate systems for taking orders. The upshot is that the computers use big programs and have big data bases to run against. Users want quick response time. They don't want to wait hours. They want seconds to minutes."

Ring says that what Honeywell and other mainframe manufacturers have known to be true—despite the dire predictions of some industry analysts—was borne out by a report prepared by Computer Intelligence Corp. of LaJolla, CA. The report, he says, identifies the phenomenon that each mainframe manufacturer has a subset of large sites growing at a rate of 40 percent a year in capacity.

International Data Corp. (IDC), Waltham, MA-market researcher, estimates that IBM Corp. garnered about a 61 percent share of worldwide general purpose computer shipments last year. That market has grown in five years from $10.9 billion in 1976 to $17.8 billion in 1981.

IDC also notes in its 1982 industry briefing session that the number of participants in the market has grown almost as impressively. In the early 1970s, competitors included IBM, Honeywell and General Electric (GE), Univac, Burroughs, National Cash Register, RCA, Control Data Corp. (CDC), Digital Equipment Corp. and Xerox Data Systems. Participants in the early 1980s include most of that same group minus GE, Xerox and RCA. But joining the fray are Amdahl, National Advanced Systems, Magnuson, Cray, Trilogy, IPL, Cambex, Spartacus, Fujitsu, Hitachi and Storage Technology Corp.

IBM anticipates growth will continue to be substantial in both new and old mainframe markets, according to a spokesperson for the industry giant. "Over the years, large-scale computers have been used by those who must process large amounts of data for tasks such as inventory control,

reservations systems, complex scientific modeling, analysis et cetera," the spokesperson told INFOSYSTEMS. "Large scale systems are now also being used for distributed data processing and network enabling and control.

"We believe growth will continue to be substantial in the 'traditional' large-scale mainframe marketplace as our customers strive to manage their expanding business segments. At the same time we see substantial growth of distributed data processing solutions that address specific user requirements."

Sperry Univac responded this summer to the imminent demise of mainframe computing by introducing its fastest and most powerful computer ever. H. Glen Haney, vice president of strategic planning and development, reports Univac has more than 2,300 1100 Series systems installed and many of these customers already are running out of power. He thinks many of these will need to migrate to the new 1100/90 within the next five years.

"Today, the value of general-purpose mainframe systems installed worldwide is $135 billion," comments John C. Butler, vice president and general manager of Univac's Americas Division. "By 1986, industry analysts estimate that the value of installed mainframes will exceed $217 billion, a 60 percent increase."

Univac has focused on six high-growth markets it believes can best utilize the power and depth of the mainframe solution, according to Butler. Those six segments—manufacturing, public sector, distribution, airlines, energy and finance—all need the integration that only a mainframe can offer, he claims.

"These markets absolutely require mainframes that have the power to integrate companywide information systems," Butler declares. "These markets cannot expect to manage their data, their applications and all of their user requirements without them."

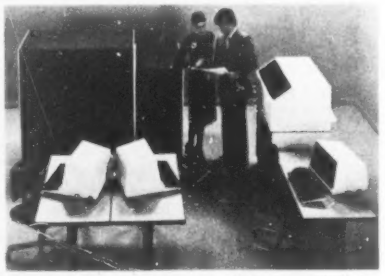
First of all, Butler points out, these markets all use large and complex data bases. Second, they all have countless managers who need access to all or part of that data. And third, they all run large numbers of application programs that require access to that same data.

"Without a large and powerful mainframe to integrate all these users and applications simultaneously, the decision-making ability of those targeted industries can be seriously impaired," Butler contends. "The solution suggested by some—isolating applications on micros and minis—can result in users who are restricted to separate data bases and have no opportunity to share information resources with other parts of the company."

Butler says the need for integrated mainframe capacity is mushrooming as computer literacy advances in a post-industrial society. He insists that distributed DP requires central coordination and control. Strategic planning at a corporate level requires central coordination and control. Office automation, communications, personal computing needs and easy-to-use computer interfaces again all require central coordination and control. The mainframe optimizes utilization and reduces costs and confusion, he states.

Haney says the 1100/90 provides more than just distributed DP capabilities. It underscores Univac's commitment to dedicated special processors. "The 1100/90 has a specially designed architecture that allows fast and easy interface with a variety of special purpose processors—processors that give customers impressive performance for particular applications," he explains. "One of these is already on the market: our front-end communications processor, the DCP 40. It is an essential device for optimizing our customer's networks."

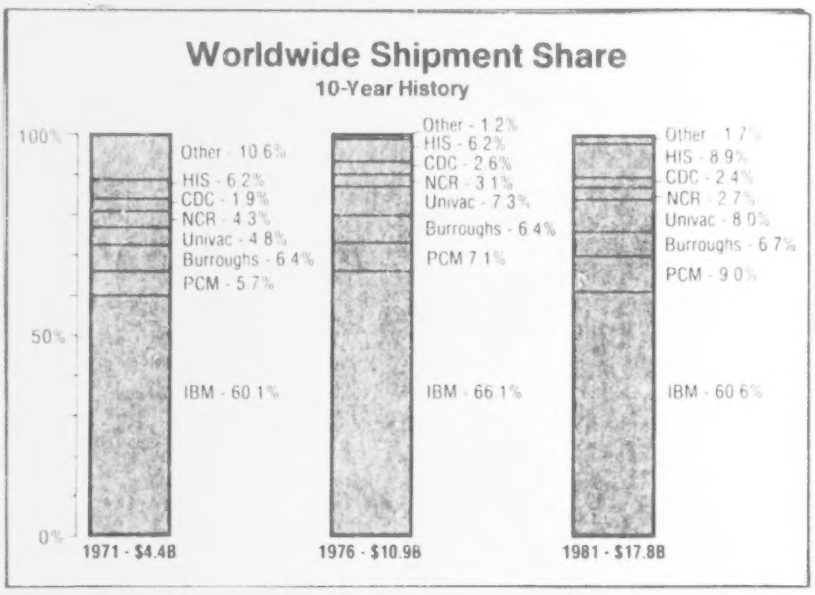
In addition to the front-end, Univac plans an additional integrated and tightly coupled special-purpose processor and a new back-end processor. The first will be a scientific processor for fields like energy where the demands of seismic processing already strain today's largest machines, according to Haney. Univac will be moving into direct competition with vendors like CDC and Cray, he notes.



NCR's I-9050 mainframe, a 32-bit system, is the largest interactive system the company has released. The mainframe offers up to twice the performance of the company's current I-8400 family computers.

The second special-purpose machine is a back-end data base processor. "The 1100/90, in particular, can work as a data base computer itself, back-ending another 1100 or a competitive machine or acting as a data base computer node in a network," Haney says. "This future advance will dramatically improve data acquisition and dissemination speeds."

Univac bases a lot of its mainframe's expanded roles on better software. Butler claims the company has developed a new set of software decision support tools that allows all levels of



Source: International Data Corp.

management to access computerized data in a new and simpler way.

Honeywell's Ring and the senior vice president of one of the leading independent software developers agree that new software is indispensable to better mainframe roles. Ring points out that the silicon chip manufacturers have been laying their lines 40 percent closer each year, enabling computers to run 20 percent faster each year. "The possibility, the probability does exist to make the machines run faster and faster," he says. "But the challenge is how to make the operating system do transaction processing (interactive, on-line processing) and still keep audit trails in place. That's the bigger challenge intellectually."

Martin Goetz, director of Applied Data Research's software products division, Princeton, NJ, acknowledges that many futurists have predicted the demise of the mainframe computer. He disagrees with them. These "so-called experts" are reacting to the ineffective use of mainframe computers during the 1960s and 1970s, he charges.

"As organizations grow in complexity the kinds of data they process and the interactions of their various departments are reflected in their data processing requirements," Goetz says. "That is why many programs and applications must process the same data. That was the reason for operating systems in the 1960s; for data base management systems in the 1970s; and for management information systems and information centers in the 1980s."

The F4000 Model 200 mainframe from Formation Inc., Mt. Laurel, NJ, includes a CPU, 2M bytes of memory, integrated disk, mag tape and unit record controllers; console, two 100M-byte disks, 45-ips mag tape and 600-lpm printer.

Business has always faced the choice of centralization or decentralization, Goetz notes, adding the choice is independent of the computer era. Based on the type of company, size, management philosophy and a great number of variables a company went through many decentralization/centralization cycles, he says.

"Through these cycles, however, control of data and of the business responsibilities has never waivered," Goetz asserts. "In other words, unless we were dealing with conglomerates, a company no matter how large would continue to consolidate responsibilities at the top. The organization chart is hierarchical with everything meeting at a corporate or higher level. So much for basics."

Goetz concedes it has not been so obvious that as computers automate business operations they must mirror the interactions, the flow of data and information, the control and the consolidation of functions. He declares only the mainframe can accomplish this.

"The future of the mainframe is secure," Goetz insists. "But new and innovative software, capable of being used at all levels within an organization on these mainframes is the challenge." He adds that that challenge has been accepted and is being met by independent software companies.

Ring chuckles about the suggestion within Honeywell that its next mainframe be named the "Mark Twain." That idea grew out of one of the humorist's most often quoted remarks: "The reports of my death are greatly exaggerated." □

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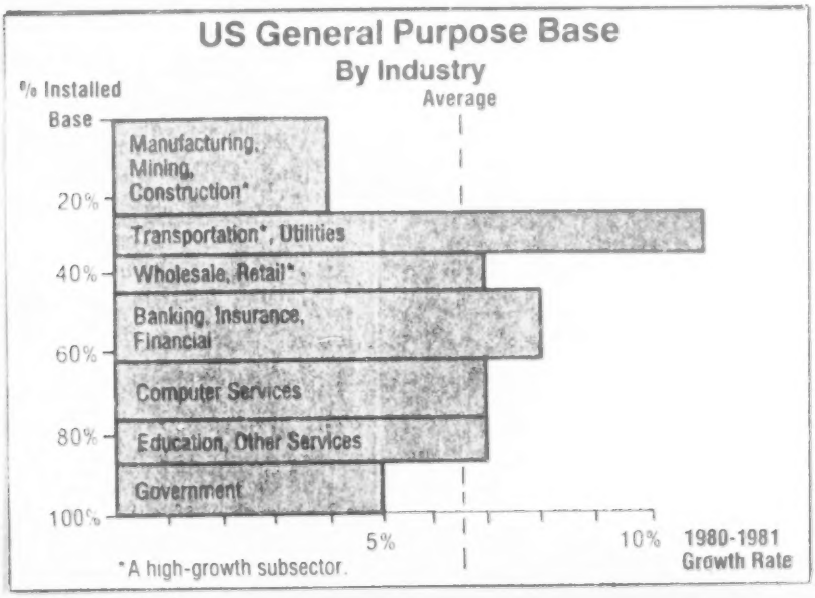

Source: International Data Corp.

IBM Disk Storage Problem Study

A 20 percent annual growth in CPU performance coupled with a 60 percent annual growth in the demand for disk storage capacity to support on-line data processing has created a "major crisis" among users of IBM computers, according to a new research report by Applied Management Services, Medford, NY.

"Unless a solution is found to improve data storage availability, users will not be able to take full advantage of the next wave of CPU performance improvements," the report said. "Data storage vendors are presently estimating that requirements for on-line data storage will be beyond their capacity to produce if demand continues at its current high level.

"For a company that has a reputation for keeping its promises, IBM has created a major problem by failing to honor its announced delivery dates for the critically needed next generation of data storage products (model 3380 disk drives)," the research report continued.

"A positive result of IBM's delay has been to create a boom in orders for IBM disk competitors, such as Storage Technology Corp., Memorex and Control Data Corp.," it continued.

Purpose of the #75 research report, a 72-page booklet, is to "assist users in making knowledgeable decisions for their organization's data storage needs." For more information on the report, enter No. 445 on the Reader Information Card in the back of this issue. □

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